

Emergency Room of the Future

After Care Support System

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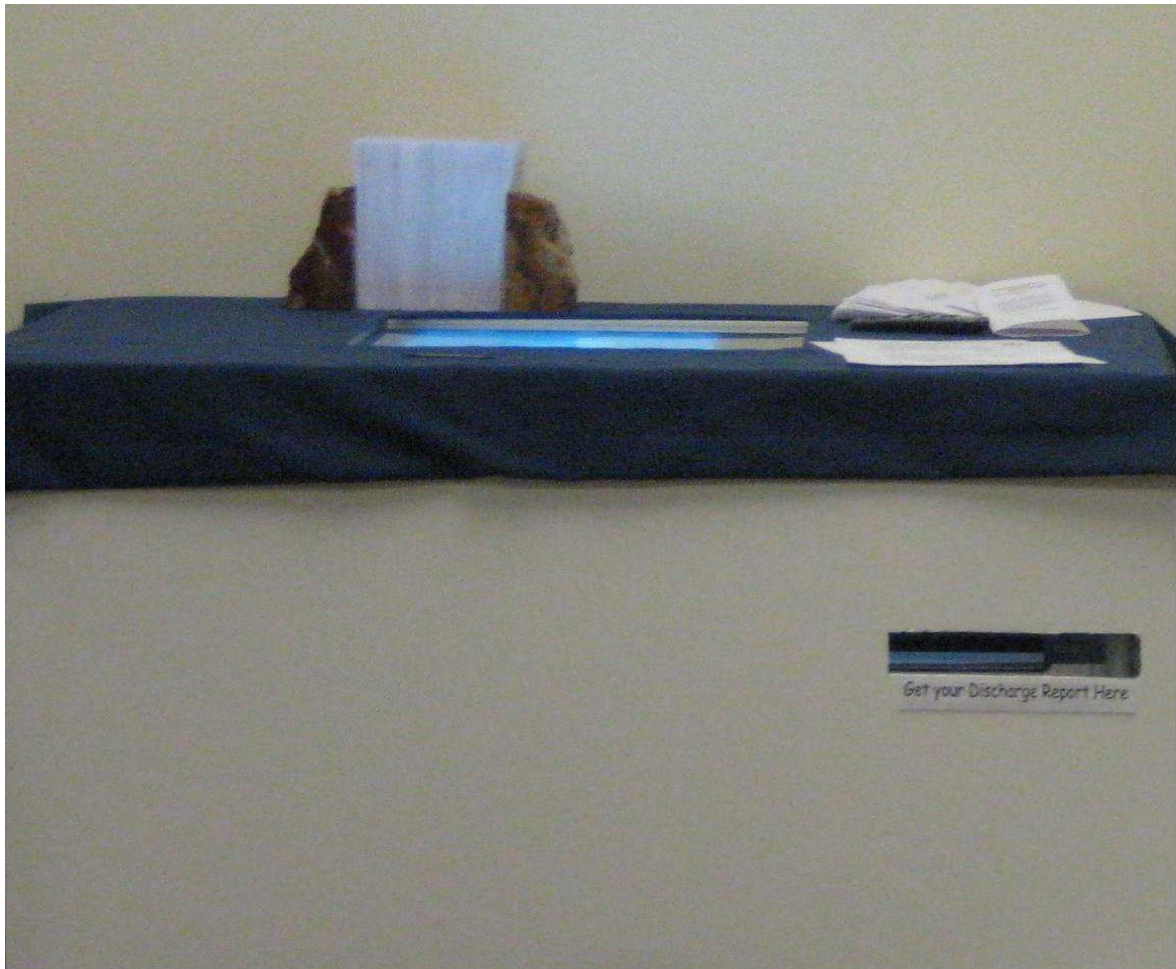


Table of Contents

Motivation	3
Related Work.....	4
Design & Implementation	4
Design	5
Our hardware solution.....	6
Our software solution.....	6
Scenario of Usage	10
Discussion	10
Future Work	11
Acknowledgement	12
References.....	12

Motivation

Every year, more than 115 million patients enter emergency rooms at hospitals around the nation. And more than three-quarters of them leave with an impression of what happened – or what should happen next – that doesn't match what their emergency care team would want. That's the finding of a new study led by University of Michigan Health System researchers, which published it in the *Annals of Emergency Medicine*.

The results suggest that emergency room teams need to do a better job of making sure patients go home with clear information and instructions – and that the patient and their loved ones shouldn't leave until they fully comprehend their situation.

The primary area of misunderstanding or lack of comprehension was post-emergency care – that is, what steps the patient needs to take to be seen by their regular doctor or a specialist, how soon to see a doctor, or what medicines or self-care steps they need to take, how to take them, and when.

34 percent of the deficiencies were in patient comprehension which reflected a less-than-complete understanding of what their ER team recommended that they should do after they leave the ER. Meanwhile, 22 percent of the deficiencies in the study had to do with patients' understanding of what symptoms or changes in their condition should spur them to return to the ER.

Our solution aims at targeting the above issue and making sure that before patients leave the ER doors they are fully aware of their discharge diagnosis so that patients are more inclined to take effective post-ER care. Moreover, the system also helps patients in scheduling follow-up appointments, giving aftercare medical instructions as well as reminding them to take their medications.

Related Work

Recently, the U-M Health System introduced a program that aims directly at this problem: the Emergency Medicine Consult/Referral Service, run by the Department of Emergency Medicine and the Physician and Consumer Communications division of Public Relations & Marketing Communications.

It is staffed by referral coordinators who follow up with ER patients by phone within 24 hours of their ER visit, to help schedule appointments with U-M physicians for primary or specialty care if the patients' insurance allows it, or make sure they know that they need to schedule an appointment elsewhere.

More than 12,000 follow-up appointments have been scheduled for recent U-M ER patients since the program began in February 2007, and 81 percent of those patients have arrived for their scheduled appointments, up from 59 percent before the program began. Appointment cancellations are also down.

Before the program began, 24 percent of U-M ER patients who needed a follow-up appointment never scheduled one. And many patients and clinicians who did try to arrange follow-up care went through a frustrating and confusing process that is repeated every day in hospitals around the country. The new call center offers a standardized, centralized way to make sure patients get scheduled to see the provider they need soon after their ER visit.

Design & Implementation

Before starting the design of our system we as a group decided to have the following restrictions on our implementation:

- The system would not require the hospital to hire extra staff for its running & management.

- Since several of such systems would be required in an ER therefore it had to be a cost efficient solution.
- The system should have a very low learning curve.
- It should be able to effectively integrate with the existing ER discharge process.
- It should not greatly alter the work flow of physicians and nurses.

Design

An Interactive Discharge table/kiosk (like a Microsoft Surface), designed to address all the core issues with discharge:

- Patients provided with info about his/her health (audio/visual).
- Given the follow-up options (Follow-up appointment & prescription alerts).
- Providers can add-on notes that are added to the EMR system.



Best/Expensive option – Buy a Microsoft surface computer and worry only about the Software Design.

- Pros: multi-touch process (doctor/patient)
- Cons: no flexible design



Our hardware solution – Simulate a Surface computer (computer + projector + touch screen)

- Pros: Cheap, can build a flexible design
- Cons: No multi-touch
- Hardware/Software support for mobile alerts (text, audio & visual)
- Wheels, adjustable (height and angle)
- Audio/Video recording/support
- Internet connectivity

Our software solution

Our system pulls in information from the current EMR system.

- The doctor uses the following screen to login to the system.

ATLANTA CARE HOSPITALS – EMERGENCY SERVICES
AFTERCARE SUPPORT SYSTEM

LOGIN

ID

Security Code

ATLANTA CARE HOSPITALS – EMERGENCY SERVICES
AFTERCARE SUPPORT SYSTEM


SELECT PATIENT

- From the screen below the doctor has access to the patient's current and previous visits to the ER. He also has access to all the patient's medical tests. Using this screen the doctor can go over the patient's discharge diagnosis.


- The patient can then take over and go through the videos and images that the system customizes for the patients diagnosis.

Doctor Name: Dr. Gregory House


Patient Name: George Williams



Patient Records



Prescription



Alerts

PRESCRIPTION:

S#	Medicine Name	Morning Dose	Noon Dose	Evening Dose	Night Dose	Learn More
1.	Asthma Inhaler	1	0	0	1	<div>Details</div>

INSTRUCTIONS:

- Schedule a follow-up appointment within the next 1-2 weeks
- Aftercare Visual Instructions -

Details

Doctor Name: Dr. Gregory House

Patient Name: George Williams



Patient Records



Prescription



Alerts

PRESCRIPTION:

S#	Medicine Name
1.	Asthma Inhaler

INSTRUCTIONS:

- Schedule a follow-up
- Aftercare Visual Instr

Illustrated discharge instructions for patients with lacerations.

1.



Keep wounds clean and dry.
 Leave bandage in place.
 Return in two days so we can check it.

2.



Elevate wound(s) above the level of the heart to reduce swelling and pain.

3.



Watch for the common signs of infection: pain, pus, swelling, redness, fever, and red streaks. If any of these signs are seen, return to the emergency department immediately.

4.



If you have received a tetanus booster, be aware that some people experience pain and mild swelling at the site of the injection. Local heat may reduce the swelling, and aspirin or acetaminophen can relieve the pain. Allergic reactions to the tetanus immunizations are rare. However, if you develop shortness of breath, a rash, or itching over the body, return to the emergency department at once. You will need a booster in 10 years, or in 5 years if you receive a severe injury or laceration.

CLOSE

- The patient can then subscribe two different kinds of alerts. The first kind of alerts sends the patient a message on his or her cell phone, reminding them to schedule follow-up appointments, the message details the names of doctors, clinics along with phone numbers where the patient can call and schedule his or her follow-up appointment. Also the patient can subscribe to receive messages at the time he or she is supposed to take their medication.

Doctor Name: Dr. Gregory House Patient Name: George Williams

Patient Records Prescription Alerts

Sign-up Appointment Reminders

Sign-up for Prescription reminders

Print/Email Discharge Instructions

This allows you to sign up the Appointment reminders as prescribed by your physician. You can choose to have reminders or opt-out from it.

I don't want the reminder

I want to sign-up for the reminders and launch application

- Finally the patient can choose to request a print of his discharge diagnosis which would be available to him immediately from the ASS's (After care support system) print slot or he can request it to be sent to his email account.

Doctor Name: Dr. Gregory House Patient Name: George Williams

Patient Records Prescription Alerts

Sign-up Appointment Reminders

Sign-up for Prescription reminders

Print/Email Discharge Instructions

Please enter your email address below to get your discharge instructions via E-Mail

Review & print discharge instructions

No thanks!

Scenario of Usage

George Williams comes to the hospital with an asthma attack. He's confused and scared because he's never had an attack before.

Dr. House after having examined George enters his diagnosis and prescription information in the currently existing EMR system and walks back into George's room pulling the "Aftercare Support System" that is on wheels & easy to maneuver (our solution).

Dr. House enters his login credentials on the touch screen and selects George's name, which opens his current record and previous medical records with access to X-rays, CT scans, blood tests etc (information pulled in from the EMR system). From here Dr. House spends a few minutes explaining to John his discharge diagnosis that includes using an inhaler every few hours and then leaves George to play with the system which contains videos and images that are customized to help him get a clear idea what asthma is, how he needs to protect himself against future attacks, how he's supposed to use an inhaler etc.

Moreover, through the system George can subscribe to alerts. These alerts send George messages on his cell phone reminding him to schedule follow-up appointment with the names and phone numbers of hospitals he can go to. Also, George can subscribe to alerts that remind him at the appropriate times to use his inhaler and other medication he's been prescribed.

Also, at the end George can either get his discharge information sent to his email account or he can get a hardcopy that is printed for him there and then.

George leaves the hospital educated and informed about his medical condition.

Discussion

-What makes our solution unique is that it's extremely cost effective. All you need is a touch screen laptop, a printer, a wireless connection and hardware that allows it to be wheeled around.

-Also the solution does not require any additional staff for maintaining and running it. The doctors and nurses can use it at the time of discharge after which they can place it back at its docking position where it can be recharged.

-A study suggests that visual illustrations help improving the discharge process by 20%. Our system builds on this study and provides the patient videos and images that are relevant to their discharge diagnosis.

-Our system is also environment friendly as it provides the patients the option whereby they can have their discharge forms and documents sent to their email accounts instead of having a hardcopy.

Future Work

-Right now 'Aftercare Support System' pulls information from the EMR system of the hospital in which it is deployed. This means that a patient who comes into this hospital for the very first time will have no previous records in 'Aftercare Support System'. Therefore, one of the future works that could greatly increase the effectiveness of system is the ability to pull patient records from different hospitals. It is not an easy task as it would require various legal issues regarding sharing patient medical records and other issues that need to be addressed.

-Currently the system is only in English; therefore if a patient is not English speaking person then it would be very difficult to use the system, therefore, giving the patient language options in the start is a part of the future work.

-The flow of control in 'Aftercare Support System' is currently based on icons and images with text that has to be read to understand what to do next. Therefore, illiterate patients would not be able to make use of it. Hence one of the important future works is to reduce text dependency in our system.

-One of the issues that was not kept in mind while designing ASS was insurance. That is, 'Aftercare Support System' does send the patient information about which hospitals or doctors to contact for follow-up care, however, if the patient does not have insurance or if he does not have significant insurance coverage then that information is of no use.

So a future work would be to provide patients with follow-up suggestions keeping in mind their insurance policy its range of coverage.

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